

2022 Refractive Update: Advances in Presbyopic and Corneal Procedures

COPE# 78910-PO

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 Virginia Eye Consultants
 Regional Medical Director
 Eyecare Partners, LLC

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Disclosures - Walter O. Whitley, OD, MBA, FAAO has received consulting fees, honorarium or research funding from:

- Aerie: C, S
- Alcon: C, S
- Allergan: C, S
- Astareal: C
- Azura: C
- Bausch and Lomb: C, S
- Biotissue: C, S
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- Heru: C, R
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- J&J Vision: C
- Kala: C
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- Ocusoft: C, S
- Ocular Therapeutix: C
- Oyster Point: C
- Orasis: C
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- Science Based Health: C, S
- Sight Sciences: C
- Sun Pharmaceuticals: C, S
- Tarsus Pharmaceuticals: C
- TearLab Corporation: C
- Vertical Pharmaceuticals: C
- Visus Pharmaceuticals: C

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Optometric Comanagement

- High quality eye care
- Benefits to patient care
 - Patient comfort
 - Patient convenience
 - Efficiency
 - Cost effective
- Utilize skills and expertise of each practitioner


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Today's Optometrists

“To be on the cutting edge of optometry, you need to be on the cutting edge of science and technology.”

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PRESBYOPIA Worldwide



2.0 B

People with Presbyopia around the globe in 2019 – growing to

2.3 B

by 2023

Presbyopes	2019	2024
US	128.7 M	136.5 M
OUS	1.93 Billion	2.17 Billion

~ 1.8 million new presbyopes a year in U.S.

Source: 2019 Market Scope Estimates

Contributing Factors:

- Aging population
- Longer life expectancies
- Longer Working Careers
- Near Vision needs
- Growing Middle Class in emerging markets

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Why Is This Important For Optometry?

- 4 out of 5 patients diagnosed with a cataract are done so by an optometrist
- Optometrists are the “gatekeepers” to cataract referrals and ATIOLs
- Referring O.D.'s must discuss all IOL options and educate patients about cataract and treatment options

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Patient Education

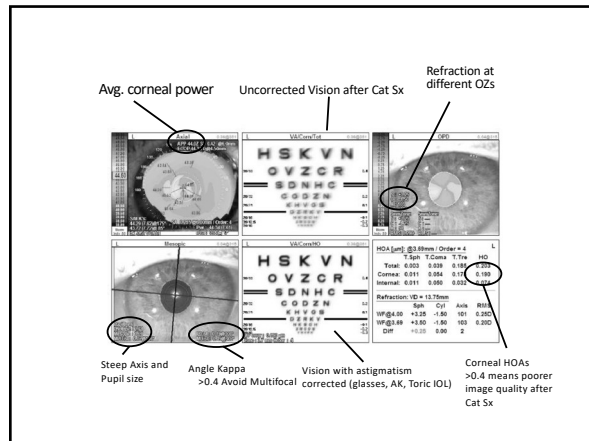
- Elements of effective education
- Explain the condition
 - Cataract
 - Astigmatism
 - Presbyopia
- Four presbyopic IOL classifications
 - Diffractive
 - Accommodating IOLs
 - Extended Depth of Focus IOLs (EDOF)
 - Trifocal

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Expect (Avoid) the Unexpected!

- Pre-op for Lifestyle IOLs
 - Topography, ocular surface testing
 - Macular OCT
 - Reliable biometry, reproducible astigmatism measurements
- Under promise and over deliver for ATIOLs
 - Emphasize need for +1.00 readers for near tasks ***
 - Discuss starbursts around lights at night

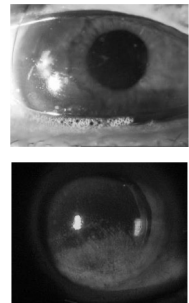
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Preparation for Ocular Surgery

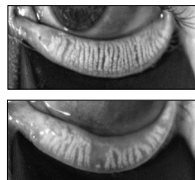
- Optimize the Ocular Surface
- Normalize the Lids
- Prepare the Cornea
- Eliminate Intra-ocular Inflammation
- Control Glaucoma
- Satisfy the Macula
- Evaluate the Retinal Periphery
- Patient Education



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Dry Eye Disease

- Chair time: blurred vision from cataracts versus DED
- Cataract sx can worsen DED for months after surgery
- Quality of vision may require chronic DED therapies



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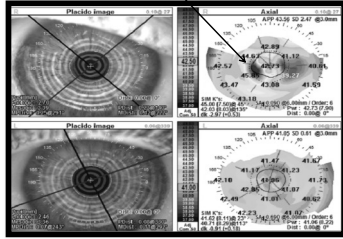
ARTICLE

Prevalence of ocular surface dysfunction in patients presenting for cataract surgery evaluation

Preedy, n, BS, Results: There were 120 patients (69% women), mean age 69.5 years ± 8.4 (SD). Abnormal osmolarity was found in 68 patients (56.7%), and abnormal MMP-9 in 76 patients (63.3%). Clinical findings showed that 47 patients (39.2%) had positive corneal staining on presentation, 9 patients (7.5%) had epithelial basement membrane dystrophy, and 2 patients (1.6%) had Salzmann nodules. Questionnaire data showed 54 (54.0%) of 100 patients reported symptoms suggestive of ocular surface dysfunction. In the asymptomatic group of 46 patients, 39 (85%) had at least 1 abnormal tear test (osmolarity or MMP-9) and 22 (48%) had both tests abnormal. Overall, 96 (80%) of 120 patients had at least 1 abnormal tear test result suggestive of ocular surface dysfunction and 48 patients (40%) had 2 abnormal results.

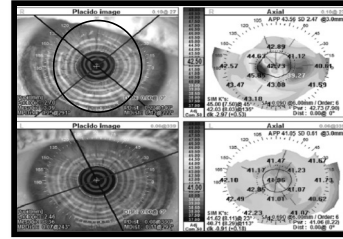
12

“Hot spots” and “Flat spots” are abnormal



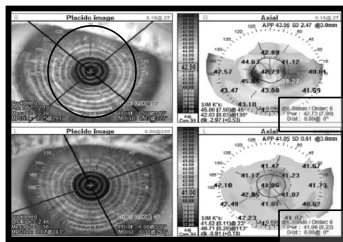
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Irregularly shaped or smudgy placido disk is abnormal!

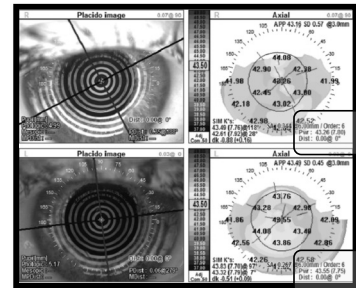


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Take a closer look if average K values are different



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REVIEW/UPDATE
An algorithm for the preoperative diagnosis and treatment of ocular surface disorders

Christopher E. Starr, MD, Preeya K. Gupta, MD, Marjan Farid, MD, Kenneth A. Beckman, MD, Clara C. Chan, MD, FRCSC, Elizabeth Yeu, MD, José A.P. Gomes, MD, PhD, Brandon D. Ayers, MD, John P. Berdahl, MD, Edward J. Holland, MD, Terry Kim, MD, Francis S. Mah, MD, the ASCRS Cornea Clinical Committee

An algorithm for the preoperative diagnosis and treatment of ocular surface disorders
 Starr, Christopher E. et al.
 Journal of Cataract & Refractive Surgery, Volume 45, Issue 5, 669 – 684 2019

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Premium IOLs: 5 Pearls (“P’s”) for Success

1. Plano Outcome
2. Proactive Tx of Ocular Surface Disease
3. Pre Op Counseling – Setting Realistic Expectations
4. Properly Screen Candidates
5. Pick the Right IOL


- Other:
6. Pick the Right Surgeon
 7. Posterior Capsular Opacification
 8. Poor IOL Centration

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ATIOLs Provide The Opportunity to Treat More Than Just the Cataract


What are your patient's post-op visual goals?

Accommodating IOLs




Crystalens*

Previous Generation of Multifocals




TECNIS Multifocal IOLs

AcrySof IQ ReSTOR




+3.0

Diffractive EDOF



TECNIS Synergy ± 1.75

Unique Multifocal Design¹




ACTIVEFOCUS™ Optical Design

1. Theoretical and the possibility of their respective centers. 2. Active Optics as of April 2016.

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Recent FDA Approval



Clareon™ IOLs utilize an innovative intraocular lens Biomaterial

- Novel hydrophobic acrylic⁶
- Produced with advanced manufacturing technology⁷
- Provide excellent clarity with low levels of surface haze, SSNGs and glistenings⁹

Clareon™ IOLs have a unique design with STABLEFORCE™ haptics⁸

- Remain planar when compressed¹⁴
- Unfold rapidly¹²

Clareon™ IOLs utilize a familiar aspheric BioOptics platform

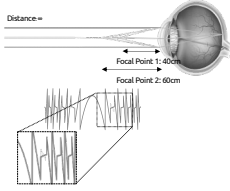
- Full 6 mm aspheric optic⁵
- Precision edge design may help reduce transmitted and reflected glare¹⁰
- Precision edge design with Clareon™ biomaterial may help reduce PCO and Nd:YAG rate^{10,11,12}

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TRIFOCAL IOL

- SUPERPOSITION OF FOCAL POINTS**
- LIGHT REDIRECTION** - 120 cm intermediate focal point redirected to distance
- 3 FOCI** – Trifocal with 40cm, 60 cm and distance
- 88% LIGHT UTILIZATION** - at 3.0 mm pupil
- LIGHT ALLOCATION** - 50% of available light to distance, 25% to intermediate and 25% to near



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Composite Binocular VA at all three distances (distance, intermediate and near) at 6 month

Proportion of patients that achieved a certain binocular VA at all tested distances

Uncorrected VA

VA Category	TF NTO 0 (n=10)	SN6 OAT (n=8)
20/20 OR BETTER	30.0%	0.0%
20/25 OR BETTER	30.0%	0.0%
20/32 OR BETTER	100.0%	37.5%
20/40 OR BETTER	100.0%	75.0%
WORSE THAN 20/40	0.0%	25.0%


Distance Corrected VA

VA Category	TF NTO 0 (n=10)	SN6 OAT (n=8)
20/20 OR BETTER	40%	0%
20/25 OR BETTER	100%	100%
20/32 OR BETTER	100%	12.5%
20/40 OR BETTER	100%	75%
WORSE THAN 20/40	0%	25%

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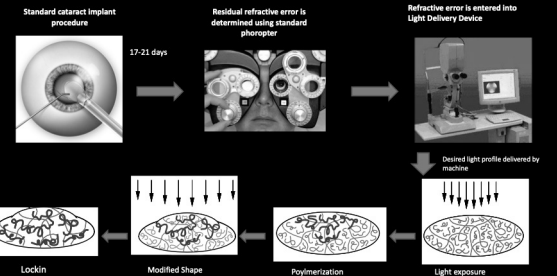
Light Adjustable Lens (LAL)

- FDA Approved 11/17 for pts with pre-existing astigmatism of $\geq 0.75D$ undergoing cat sx
 - Spherical and cylindrical errors up to 2D
- First and only lens designed to be **adjusted** after implantation by UV light
- 3 piece IOL design
- 6.0mm biconvex optic; 13.0mm overall length
- UV absorbing back layer: 50-100 μm



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Prediction to Prescription



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Flexible Treatment Profiles

One Lens Replaces Many Lenses

Starting Wavefront

Light Profile

Resulting Wavefront

Myopia

Hyperopia

Astigmatism

EDOP (Extended Depth of Focus)

Multifocal

Combined Treatment

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LAL Will Expand Monovision Use

- **Monovision used 3-4x more than PC-IOLs**
 - Usual target: 0.75D-1.00D anisometropia
 - W/ average 0.5D SD, hard to hit target
 - If miss first eye, acuity degradation/ binocular fusion
- **LAL will dramatically increase binocular accuracy**
 - Standard deviation reduced to 0.2D
 - Patient ability to test-drive/adjust final outcome
 - LASIK-like outcomes
- **Creates new premium channel opportunity**

IOL Type	Refractive Error (Standard Deviation)
Non-Adjustable	0.5D
RxLAL	0.2D

1. 2019 ESCRS Survey 2. Average age at EDOF 1. David Chang MD PhD

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FDA Clinical Results

- 91.8% within 0.50 D of target manifest refraction spherical equivalent
- Results showed that 100% of study eyes had a best corrected visual acuity of 20/40 or better at the 6 month po visit.

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What's Next in IOL Technology?

- Modular IOL Systems
- Accommodating
- Multifocal / trifocal
- Extended Depth of Focus

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Accommodating IOL – LensGen Juvene

- Modular, curvature-changing, fluid-optic IOL
- Two-part IOL - Base and Modular
- Advantages
 - Doesn't split light
 - Up to 3D of continuous range vision
 - No change in ELP
 - No PCO up to 4 years
- Astigmatism?? Drug Delivery?? Exchangeable 2nd implant??

**Not FDA Approved

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Accommodating IOL – Alcon FluidVision Lens

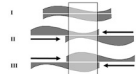
- Entire lens is hollow and filled with liquid silicone
- Fluid changes changes in optic
- Avg. accommodation range 2D
- Dr. Nichamin ESCRS 2018
 - 29 eyes
 - Distance 20/20
 - Intermediate 20/20-20/25
 - Near 20/22-20/27

**Not FDA Approved

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Accommodative IOL – Akkolens Lumina



- Two piece sulcus IOL
 - Fixed and variable
 - Hydrophilic acrylate
- Shifting optics
 - Can provide 3-4 D focal range when shifted
- Dr. Alio - 59 eyes of 43 pts
 - Accommodative range of 3.1D

**Not FDA Approved

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EDOF - Vivity IOL

Disturbance	Active Acrylic Optics				Passive Acrylic Optics			
	MD*	Moderate	Severe	MSE	Moderate	Severe	MSE	
Starburst	81.2%	52.2%	3.8%	55.1%	11.8%	2.2%	2.2%	
Glare	11.0%	8.5%	0.5%	8.2%	2.0%	0.5%	0.5%	
Color	14.2%	8.6%	0.5%	9.1%	0.9%	0.0%	0.0%	
High Contrast	3.0%	4.8%	4.8%	2.7%	8.1%	0.0%	0.0%	
Blurred Vision	7.5%	0.1%	0.0%	0.0%	2.7%	0.0%	0.0%	
Double Vision	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Dark Area	2.8%	0.0%	0.0%	0.3%	0.9%	0.0%	0.0%	

Source: Akkolens IOL FDA Clinical Trial

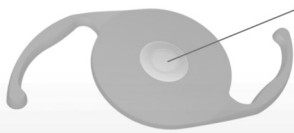
- Non-diffractive IOL
- Novel X-Wave shaping technology creates an extended focal range by stretching and shifting the wavefront
- Low incidence of visual disturbances
- Possible for AMD?? Glaucoma??



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SMOOTH SURFACE TRANSITION ELEMENTS: SIMULTANEOUSLY STRETCH AND SHIFT THE WAVEFRONT WITHOUT SPLITTING IT!

X-WAVE™ Technology Consists of 2 Smooth Surface Transition Elements

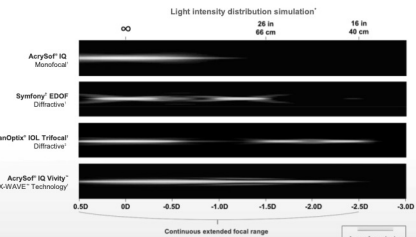


Surface Transition 2: Small Curvature Change (across the ~2.2 mm region) shifts the wavefront to utilize all available light energy

Reference: 1. Akkolens Data on File, 2018. The AcrySof® IQ Vivity™ IOL will be available in both EU and US only at market launch.

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NON-DIFFRACTIVE X-WAVE™ TECHNOLOGY: CREATES A CONTINUOUS EXTENDED FOCAL RANGE

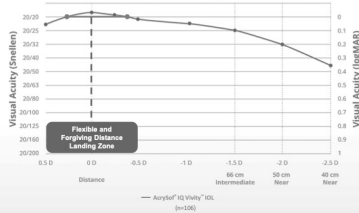


*Simulated photos through focus point (central fovea) (right (nearby) image) – polyfocal. †Reference to the graphs of other respective lenses. Reference: 1. Akkolens Data on File, 2018. 2. Akkolens Data on File, 2018.

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OUTSTANDING OVERALL PERFORMANCE: DESIGNED TO PROVIDE A CONTINUOUS EXTENDED RANGE OF VISION

6-Month Binocular Distance Corrected Defocus Curve*



*In this clinical study, acromegaly was targeted for this lens. Slight hyperopia (H) (< 0.5 D) may impact uncorrected distance visual acuity, which may lead to decreased near vision. Reference: 1. AcrySof® IQ Vivity™ Extended Vision IOL, Diagnostics for Care.

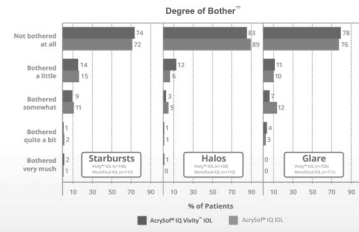
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PATIENT-REPORTED VISUAL DISTURBANCES: LOW LEVELS OF BOTHER SIMILAR TO MONOFOCAL!

Validated QUID Questionnaire: "In the past 7 days, how much were you bothered with starbursts, halos and glare?"

Percent of patients bothered very much!:

- 2% by starbursts
- 1% by halos
- 0% by glare



*Results from a prospective, randomized, double-blind, subject- and assessor-masked, multicenter trial of 107 subjects bilaterally implanted with the AcrySof® IQ Vivity™ Extended Vision IOL and 110 with the AcrySof® IQ IOL with 6 months' follow-up. †Assessment using QUID questionnaire. Reference: 1. AcrySof® IQ Vivity™ Extended Vision IOL, Diagnostics for Care.

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Tecnis Eyhance

- First lens^[1] in the monofocal IOL category in Europe to deliver improved intermediate vision and 20/20* distance vision
- TECNIS Eyhance IOL offers the same well-established low incidence of halo, glare, or starburst as TECNIS® 1-piece IOLs
- FDA approved 2/2/21

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Tecnis Synergy

- Gives broad range of continuous vision covering from distance to 33 cm**4-6
- Eliminates the visual gaps present in trifocal and other multifocal technology
- Continues to deliver superior performance in low-light conditions***2
- Violet-filtering technology demonstrates reduction in halo intensity for tasks like night driving⁷



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Trifocal IOL - PhysIOL

- Aspheric diffractive trifocal
- 2 diffractive structures that give +3.5D add for N and +1.75D for intermediate
- Less glare and halos
- Designed to reduce the loss of light energy resulting from any diffractive system
- Diffractive anterior surface entirely convoluted
- Height of the diffractive step varied
- Distributes light to near, intermediate and distant foci adjusted according to the pupil aperture



**Not FDA Approved

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“Pinhole” IOL Design

- IOL Material
 - Single-piece hydrophobic acrylic
- Mask
 - PVDF & nanoparticles of carbon
 - 1.36mm aperture
 - 3.23mm total diameter
 - 3200 microperforations
 - 5 microns thick



**Not FDA Approved

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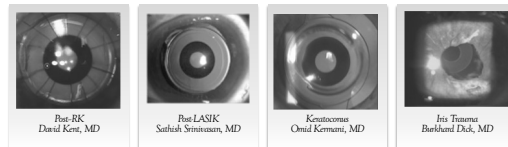
H. B. Dick, PhD, MD
T. Schultz, MD



University Eye Hospital, Bochum, Germany

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Presbyopia Correction No Longer Only for the Perfect Cornea!



Pin-RK David Kent, MD

Pin-LASIK Sathish Srivastava, MD

Keratoma Omid Kermani, MD

Iris Transus Burkhard Dick, MD

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20/Unhappy

Causes of unhappiness

- Refractive Error
- Dryness
- PCO
- Positive Dysphotopsias
- Problematic Near Point
- Visually Demanding

Woodward MA, Randieman JB, Stalling RD. Dissatisfaction after multifocal intraocular lens implantation. Journal of cataract and refractive surgery. 2009;35(6):992-997. doi:10.1016/j.jcrs.2009.01.031.

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Neuroadaptation of Multifocal IOLS

- Patients' expectations of time frame needed to adapt needs to be managed
 - These patients require more counseling post-op
 - Neuroadaptation can take as long as 6-12 months
 - About 10% never neuroadapt (will need IOL exchange)
 - No way of testing before surgery which patients will be able to adapt vs not
- Multifocal IOLS will induce more aberrations than monofocal IOLS

Take away: no YLC to be performed until rule out that IOL exchange is necessary

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Refractive Enhancement: Laser Vision Correction (LVC)

- **Timing is everything!**
- Wait at least 2-3 months after cataract surgery for wounds and LRIs to settle
- Nd:YAG posterior capsulotomy **BEFORE** LVC
 - No YAG in multifocal IOL that was never happy

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Managing the Unexpected Outcome: Have an Algorithm to Identify the Issue

- Develop communication with your staff regarding dissatisfied patients
 - Encourage clinic techs to communicate patient satisfaction to you
 - Have work-up done before you see the patient
 - MRx BCVA/Topo/OCT/Ocular surface testing
 - Have a plan to fix the problem before you enter the room!

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Innovative Technologies in Refractive Surgery and Presbyopia

Photo accessed from <https://www.gettyimages.com/detail/photo/fountain-of-youth-archway-at-the-university-of-florida-royalty-free-image/100546879> on 11/2/17

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Large and Growing Global Myopia Market

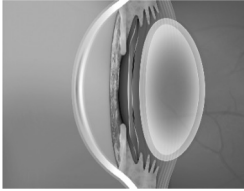
By 2050*

- Myopia is projected to affect almost half of the world's population
- 5 billion with myopia
- 1 billion with high myopia (>-6D)
- In the United States and Canada, myopia to increase to 260 million, or close to half of the population, up from 89 million in 2000

*Holden BA, et al. Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050. Ophthalmology. 2016 May;123(5):1036-42.

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ICL: 20+ Years of global experience




- Sharp and clear vision, including at night
- Removable and biocompatible lens
- Can be used for myopes with thin corneas^{1,3}
- Flexibility for future procedures
- Long term history and over 1 million implants
- Does not contribute to dry eye syndrome
- UV Protection

1. Parkhurst, G. Clinical Ophthalmology 2013; 10: 1209-1215.
2. Parkhurst, G., Puckin, M., Swanson, G. J Refract Surg. 2011;27(7):473-480.
3. Gombel, Howard V et al. Journal of Cataract & Refractive Surgery, Volume 38, Issue 3, 483 - 486.
4. Spekreijse, J.J., van der Velden, H., van der Velden, H., van der Velden, H. Symposium. Presented at American Society of Cataract and Refractive Surgery (ASCRS), 2017.

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- Toric ICL – US FDA approval in 2018
 - Correction of myopic astigmatism with spherical equivalent ranging from -3.0 D to \pm -15.0 D (in the spectacle plane) with cylinder (spectacle plane) of 1.0 D to 4.0 D in the spectacle plane.
 - Reduction of myopic astigmatism with spherical equivalent ranging from greater than -15.0 D to -20.0 D (in the spectacle plane) with cylinder (spectacle plane) 1.0 D to 4.0 D in the spectacle plane.
- The US FDA clinical study data of [redacted] was submitted to the FDA in April 2021.




Not approved in the US Not approved in the US

STAAR Vision Toric Implantable Collamer Lens (ICL) for Myopia (TICL). Directions for Use.

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PRESBYOPIA

by the numbers



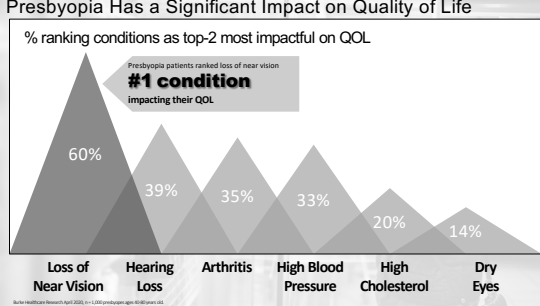
- **1.8 billion** affected globally¹ (affecting more people now than ever before)
- **128 million** American presbyopes^{2,3}
- **31 million** buy readers per year⁴ (often at drugstores or supermarkets)
- **100%** of adults at risk of developing presbyopia as they age⁵

1. Fritsch TR, et al. Ophthalmology 2016;125:1450-1459. 2. Chang DH. Ophthalmology Times. Accessed November 4, 2021. 3. American Optometric Association. 2021. 4. Vision Council. 2021. 5. Vision Council. Accessed October 20, 2021. 6. Vision Council. 2021. 7. Vision Council. 2021. 8. Vision Council. 2021. 9. Vision Council. 2021. 10. Vision Council. 2021. 11. Vision Council. 2021. 12. Vision Council. 2021. 13. Vision Council. 2021. 14. Vision Council. 2021. 15. Vision Council. 2021. 16. Vision Council. 2021. 17. Vision Council. 2021. 18. Vision Council. 2021. 19. Vision Council. 2021. 20. Vision Council. 2021. 21. Vision Council. 2021. 22. Vision Council. 2021. 23. Vision Council. 2021. 24. Vision Council. 2021. 25. Vision Council. 2021. 26. Vision Council. 2021. 27. Vision Council. 2021. 28. Vision Council. 2021. 29. Vision Council. 2021. 30. Vision Council. 2021. 31. Vision Council. 2021. 32. Vision Council. 2021. 33. Vision Council. 2021. 34. Vision Council. 2021. 35. Vision Council. 2021. 36. Vision Council. 2021. 37. Vision Council. 2021. 38. Vision Council. 2021. 39. Vision Council. 2021. 40. Vision Council. 2021. 41. Vision Council. 2021. 42. Vision Council. 2021. 43. Vision Council. 2021. 44. Vision Council. 2021. 45. Vision Council. 2021. 46. Vision Council. 2021. 47. Vision Council. 2021. 48. Vision Council. 2021. 49. Vision Council. 2021. 50. Vision Council. 2021. 51. Vision Council. 2021. 52. Vision Council. 2021. 53. Vision Council. 2021. 54. Vision Council. 2021. 55. Vision Council. 2021. 56. Vision Council. 2021. 57. Vision Council. 2021. 58. Vision Council. 2021. 59. Vision Council. 2021. 60. Vision Council. 2021. 61. Vision Council. 2021. 62. Vision Council. 2021. 63. Vision Council. 2021. 64. Vision Council. 2021. 65. Vision Council. 2021. 66. Vision Council. 2021. 67. Vision Council. 2021. 68. Vision Council. 2021. 69. Vision Council. 2021. 70. Vision Council. 2021. 71. Vision Council. 2021. 72. Vision Council. 2021. 73. Vision Council. 2021. 74. Vision Council. 2021. 75. Vision Council. 2021. 76. Vision Council. 2021. 77. Vision Council. 2021. 78. Vision Council. 2021. 79. Vision Council. 2021. 80. Vision Council. 2021. 81. Vision Council. 2021. 82. Vision Council. 2021. 83. Vision Council. 2021. 84. Vision Council. 2021. 85. Vision Council. 2021. 86. Vision Council. 2021. 87. Vision Council. 2021. 88. Vision Council. 2021. 89. Vision Council. 2021. 90. Vision Council. 2021. 91. Vision Council. 2021. 92. Vision Council. 2021. 93. Vision Council. 2021. 94. Vision Council. 2021. 95. Vision Council. 2021. 96. Vision Council. 2021. 97. Vision Council. 2021. 98. Vision Council. 2021. 99. Vision Council. 2021. 100. Vision Council. 2021.

51

Presbyopia Has a Significant Impact on Quality of Life

% ranking conditions as top-2 most impactful on QOL



Presbyopia patients ranked loss of near vision **#1 condition** impacting their QOL

Condition	% ranking as top-2 most impactful on QOL
Loss of Near Vision	60%
Hearing Loss	39%
Arthritis	35%
High Blood Pressure	33%
High Cholesterol	20%
Dry Eyes	14%

Source: HealthScan Research, April 2021. n=1,000 presbyopia aged 40-60 years old.

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Current Presbyopia Management Landscape

Based on Market Research Findings, Most Patients Use OTC Readers, Multifocal Lenses, or Prescription Readers for Correction

78% of respondents use some form of vision correction

24% of presbyopia patients are not currently seeing an Eye Care Practitioner

72% are currently using OTC readers

Treatment	% of Patients Ever Used	% of Patients Currently Using
1. OTC Reading Glasses	58%	47%
2. Multifocal Lens Glasses	55%	40%
3. Prescription Reading Glasses	48%	35%
4. Contact Lenses	35%	18%
5. Surgical Intervention*	17%	N/A

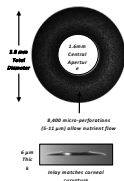
Note: Total adds to >100% because patients may use more than one treatment. N = 797 age-appropriate patients, weighted for gender based on census data. *Surgical intervention = conductive keratoplasty, refractive lens exchange, corneal inlay, laser monovision, photorefractive keratectomy, and LASIK.

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KAMRA® Inlay

First US approved corneal inlay; commercially available in 50 countries

Effective, Reliable and Safe Presbyopia Solution

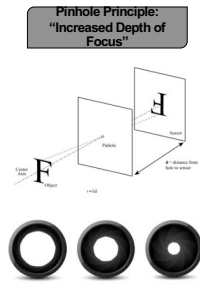


- ✓ Improves near vision with minimal impact to distance vision
- ✓ Achieves long-lasting results even as presbyopia progresses
- ✓ Implanted into corneal pocket created with femtosecond laser
- ✓ Implanted monocularly into non-dominant eye
- ✓ Highly biocompatible material
- ✓ Made from Polyvinylidene Fluoride (PVDF)
- ✓ Removable via low-risk procedure with recovery of pre-inlay vision

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How It Works

- The inlay works like an aperture in a camera (opening)
- This small opening allows only focused images in the eye
- Only focused light rays to reach the retina
- Same principle used in camera lenses to increase depth-of-focus



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Indications for Use

- Patient who is between 45 and 60 years old
- Cycloplegic refraction between +0.50 D and -0.75 D with less than or equal to 0.75 D of refractive cylinder
- Patient does not require glasses or contact lenses for clear distance vision
- Patient requires near correction of +1.00 D to +2.50 D of reading add

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Inlay Patient- Exclusion Criteria

- Any ocular or systemic disease that is a contraindication for corneal refractive procedures including:
 - Keratoconus
 - Uncontrolled and/or severe dry eye
 - Cataracts
 - Macular degeneration
 - Corneal dystrophy or degeneration
 - Amblyopia or Strabismus
- Patients with unrealistic expectations
- Patients with psychological conditions

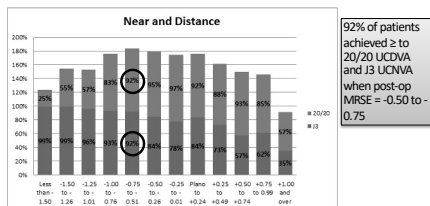
57

Post-op Exam

- Minimum follow-up:
 - 1 day
 - 1 week
 - 1, 3, 6 months
 - 1 year
- Patients should be *seen more frequently* if abnormal post-op findings are observed

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Effectiveness of Post-op MRSE



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Pharmacologic Treatments for Presbyopia Are Coming, With Miotic Drops Occupying the Majority of Development

Topical Drops in Development	Active Ingredient(s)	Mechanism of Action
CSF-1 (Orasis)	Pilocarpine	Miotic
AGN 190584 (Allergan)	Pilocarpine	Miotic
AcuStream™ (Kedallon)	Pilocarpine	Miotic
True Vision Treatment™ Contact lenses and Eye Drops Kit (Vista Health)	Hyaluronidase and collagenase	Alters cornea ¹
VP1-001 (Viewpoint Therapeutics)	Stabilizing alpha-crystallin molecule	Target's protein misfolding to restore native, functional shape ²

VP1-001 (Viewpoint Therapeutics)

- Miotic drops increase depth of field by inducing a pinhole effect
 - Low risk, highly effective and easily reversible compared to surgical alternatives
 - Miotic drops aren't without side effects - headache, brow ache, IOP fluctuations, myopic shift and hypermetropia³
 - Single-agent cholinergic miotics likely to have more of an issue with these side effects than combination drops
- Lens softening topical agents intend to increase ability to accommodate with usage over time


1. Lash et al. Ocul. and Contact Lens. 2018; 33(1): 1-10. 2. Viewpoint Therapeutics. VP1-001 (Viewpoint Therapeutics) Clinical Study Report. 2018. 3. Viewpoint Therapeutics. VP1-001 (Viewpoint Therapeutics) Clinical Study Report. 2018. 4. Viewpoint Therapeutics. VP1-001 (Viewpoint Therapeutics) Clinical Study Report. 2018. 5. Viewpoint Therapeutics. VP1-001 (Viewpoint Therapeutics) Clinical Study Report. 2018.

60

Patients Looking for Efficacy, Durability and Favorable Side Effect Profile

Thinking about the features of this potential new eye drop medication, which features are most appealing to you?

- Efficacy** – restore functional near vision as well as current solution (glasses/contacts)
- Duration** – lasting throughout a work day (minimum)
- Side Effect Profile & Tolerability** – minimal brow ache/headache, minimal burning/stinging
- Cosmesis** – eyes should be white and quiet



EFFECTIVE	...as reading glasses	94%
LONG-LASTING	...at least 8 hours	96%
COMFORTABLE	...mild/minimal side effects	83%

Burke Healthcare Research April 2020, n = 1,000 presbyopes ages 40-80 years old

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U.S. Presbyopia Miotic Drop Landscape is Crowded in the Short-acting Space

Duration: 2-4 Hours

- Phase 2: Brimonidine, Pilocarpine, Acetylcholinesterase Inhibitors (e.g., Donepezil, Galantamine, Rivastigmine), Prostaglandin Synthetase Inhibitors (e.g., Brufen, Celecoxib, Naproxen)
- Phase 3: NDA (New Drug Application)

Duration: 8-12 Hours

- Phase 2: Brimonidine + Carbamide Combination, Brimonidine, Pilocarpine, Acetylcholinesterase Inhibitor, Acetylcholinesterase Inhibitor + Pilocarpine

1. Ophthalmology (June 2012), 121(6):1095-1101. 2. Ophthalmology (Nov 2013), 122(11):2097-2103. 3. Ophthalmology (July 2014), 123(7):1317-1323. 4. Ophthalmology (September 2015), 124(9):2067-2073. 5. Ophthalmology (February 2016), 125(2):339-345. 6. Ophthalmology (October 2016), 125(10):2375-2381. 7. Ophthalmology (June 2017), 126(6):1095-1101. 8. Ophthalmology (December 2017), 126(12):2215-2221. 9. Ophthalmology (April 2018), 127(4):735-741. 10. Ophthalmology (October 2018), 127(10):1915-1921. 11. Ophthalmology (April 2019), 128(4):735-741. 12. Ophthalmology (October 2019), 128(10):1915-1921. 13. Ophthalmology (April 2020), 129(4):735-741. 14. Ophthalmology (October 2020), 129(10):1915-1921.

62

WHAT IS THE OPTIMAL PUPIL SIZE RANGE?¹

Bright Light (4,000 lux)
Natural pupil: 4 mm
Optimum: 1.6-2.0 mm

Mesopic (48 lux)
Natural pupil: 6 mm
Optimum: 2.4-3.0 mm

Low Mesopic (0.4 lux)
Natural pupil: 7 mm
Optimum: 2.8-3.5 mm

OPTIMA L PUPIL SIZE
Up **40% TO 50%** of the natural pupil size improves near vision without compromising distance vision!

¹All figures adapted from: Li, Y. R., et al. Optom 95, 5: 2016:502-510

63

Which Patients May Be the Best Candidates for Miotic Drops?

- Emmetropes**
 - Least comfortable with vision correction surgery
- Post-LASIK emmetropes**
 - Have already made significant investment to be glasses-free
 - If LASIK was performed prior to wavefront-guided procedures and aspheric optical zones, pupil constricting drops may also help to address higher order aberrations, glare and halo
- Hyperopes**
 - Will improve vision at distance and near
- Pseudophakes**
 - Monofocal IOL patients may opt to use drops instead of readers
 - Premium IOL patients may want additional near vision than their IOL provided

Contraindications

- High myopes
- Past history of retinal tears

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Pseudophakes Very Interested in Trying a Presbyopia Drop – a Highly Motivated Patient Segment

If your eye doctor recommended it, how likely would you be to try this new eye drop to temporarily restore your near vision?

% OF PSEUDOPHAKES IN COMPARISON TO ALL RESPONDENTS WHO RESPONDED "DEFINITELY WILL TRY"

Group	% Responded "Definitely Will Try"
ALL RESPONDENTS	58%
PSEUDOPHAKES (ALL)	79%
PREMIUM IOL PATIENTS	91%

79% of pseudophakes report they "definitely will try" a new presbyopia eye drop

Burke Healthcare Research April 2020, n = 1,000 presbyopes ages 40-80 years old

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Presbyopia Prevention Drug?

Anti lens disulfide crosslinking improves natural lens elasticity

Randomized phase 1/2 90 day treatment
50 Subjects (EV66)
25 Controls (placebo)

Proportion ≥ 20/40 at Near of Day 90 (Uncorrected)

EV66	82%
Placebo	48%

EV66: 0% 20% 40% 60% 80% 100%
Placebo: 0% 20% 40% 60% 80% 100%

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Non-invasively Stabilizing and Reshaping the Cornea Corneal Remodeling Technology

Pharmaceutical Application

kxi

Uniform Activation to Stabilize

Mosaic

Targeted Activation to Reshape

The Mosaic System, Boost Goggles, and monographed drug formulations are not sold in the United States

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Corneal remodeling for non-invasive reshaping the cornea without ablation or incision

GLASSES (dependence) MULTI-FOCAL CONTACTS (dependence) DROPS (not approved) (dependence) DROPS & UV LIGHT (independence) LASIK (independence) INLAYS (independence) REFRACTIVE LENS EXCHANGE (independence)

Least Invasive → Most Invasive

30 minutes to vision renewal

Investigational. Not FDA approved.

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PIXL for Vision Improvement Non-invasive corneal remodeling

Treatment Concept	Visual Target	Patient Experience
One time, non-invasive corneal remodeling treatment	Spectacle independence Binocular UNVA of J2 or better No halo or loss of CDVA	Non-invasive, simple procedure 1-2 day recovery Long-term stability of CDL

Peripheral Activation for Presbyopia

Central Activation for Myopia

Investigational. Not FDA approved.

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PIXL for Presbyopia

Spatially targeted, epithelium-on, accelerated cross-linking

More than 200 eyes treated internationally with PIXL to date

- Midperipheral cross-linking, no UVA applied to central cornea
- Image above: High resolution OCT image showing mid peripheral corneal stromal demarcation line after epi-ON PIXL with oxygen

53 year old male
+1.25 D correction

Acquisition date: 10/20/2016 10:58:26 (1-2)

Pre-PIXL

Acquisition date: 10/25/2016 10:15:43 (1-3)

Post-PIXL

Clinical case example from Jeff Machat, MD

Investigational. Not FDA approved.

70

- A potential non-invasive solution for presbyopia
- Filling a gap in refractive treatment options
- Drops, UV light and O₂
- Targeted corneal reshaping with long-term durability of cross-linking
- Likely advantageous for post operative cornea adjustability
- Early clinical results are promising
- Multicenter Phase II Study in 2019

PIXL

Mosaic System
Proprietary computer software and UVA beam forming technology

Boost Goggles

New Drug Formulations
Proprietary single-use drug formulations

Investigational. Not FDA approved.

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Ocular Rigidity Correlation Age-Related Eye Diseases

Decreased Ocular Blood Flow

Ocular Rigidity & Age-related Eye Diseases:

- ❖ Age Related Loss of Visual Accommodation → Presbyopia
- ❖ Age Related Increase in IOP → Glaucoma
- ❖ Age Related lens stiffening → Cataract
- ❖ Age Related decrease → AMD & other Pathos

Glaucoma

Age-Related Macular Degeneration

72

Ocular Rigidity: Leads to **Loss of Visual Accommodation**

Decreased Ciliary Muscle Force to contract lens
Increased Scleral Rigidity
Increased lens curvature

Detorakis ET, Pallikaris, IG. Ocular rigidity: bio-mechanical role, in vivo measurements and clinical significance. *Clin Experiment Ophthalmol* 2012 May 18.

73

Solution: Laser Scleral Microporation "Uncrosslinking" Scleral Microfibrils to Rejuvenate BioDynamics

Problem

- ↑ Ocular/ Scleral rigidity
- ↓ Efficiency Ciliary Muscle Forces
- ↓ Lens shape changes during accommodation
- ↑ Positive Spherical Aberration (SA)/undesirable monochromatic aberrations

LSM Solution

- ↓ Scleral biomechanical Stiffness
- ↑ Ciliary Muscle forces on the Lens
- ↑ Lens shape changes during accommodation
- ↓ Positive Spherical Aberration SA/undesirable monochromatic aberrations

Age Related Scleral Rigidity

LSM over Ciliary Muscle

LSM

LSM Rejuvenation

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Laser Scleral Microporation: LSM Procedure

Courtesy Dr. Mitch Jackson

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Clinical Data Summary

174 persons
348 eyes

89%
of Patients

DCNVA 20/40 or better

0.3
logMAR

↑ Increase in Near Vision

↓ Reduction in IOP

28%

Data from IRB Registered Pilot Clinical Trial; N=22 Patients; Remote monitored data; Data collection is ongoing

Growing Evidence on LSM Ocular Rejuvenation

Internal information from Ace Vision Group: AnnMarie Hipsley, DPT, PhD, Robert T. Ang, MD, Mitch Jackson, MD

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Allogenic Corneal Inlay (Allotex)

PEARL: PrEsbyopic Allogenic Refractive Lenticule

- Increasing central corneal power to improve near vision

Ex2 - Ext: CT Axial Power
Diopters

2.89
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
-0.00
-0.25
-0.50
-0.75
-1.00
-1.25
-1.50
-1.75
-2.00
-2.25
-2.50

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Excimer laser shaped corneal inlays

Scaling

Valuable use of gifted human tissue!

Predictability

Human tissue shaped with excimer laser precision.

www.allotex.com

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European Multicenter Study: Interim data analysis (20 eyes)

	Preoperative	Postop (last visit)
UCVA of 20/40 or better (monocular)	0%	95%
Near Vision (binocular)		Gain: +17 letters (mean)
Intermediate Vision (binocular)		Unchanged: +2 letters (mean)
Distance Vision (binocular)		Unchanged: -2 letters (mean)

*** last visit was 1 or 3 months after surgery c/o Aylin Kylic, MD

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The LIRIC Platform: Laser Induced Refractive Index Change for Refractive Error Correction

LIRIC: a disruptive technology

Poised to revolutionize:

- refractive surgery
- cataract surgery
- contact lenses

A revolutionary way to refine the optics of the eye

- Minimally invasive
- No flap, epi on, no doping
- No nerve damage

- Post-implantation optical touch-up
- Monofocal to multifocal & vice-versa
- Correct residual refractive error

- Enables diffractive multifocals for better presbyopia correction
- Thin lenses for all prescriptions
- Better oxygen transmissibility

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The LIRIC Platform

Low-Pulse Energy Femtosecond Laser

- **Refractive Index Modification**
 - Refractive error correction^{1,2,3}
 - Presbyopia correction^{4,5}

Refractive Index Bends Light

Air	1.00
Water	1.33
Cornea	1.39
Contact Lens	1.42
Glass	1.50

1. Gandara-Montano et al., Optical Materials Express, 2017
2. Gandara-Montano et al., Optical Materials Express, 2018
3. Zheleznyak et al., ARVO 2018
4. Zheleznyak et al., ARVO 2019
5. Butler et al., ARVO 2019

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The LIRIC Platform

Low-Pulse Energy Femtosecond Laser

- **Refractive Index Modification**
 - Refractive error correction^{1,2,3}
 - Presbyopia correction^{4,5}

Sph & Cyl

Custom HOAs

Presbyopia

1. Gandara-Montano et al., Optical Materials Express, 2017
2. Gandara-Montano et al., Optical Materials Express, 2018
3. Zheleznyak et al., ARVO 2018
4. Zheleznyak et al., ARVO 2019
5. Butler et al., ARVO 2019

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The LIRIC Platform

Low-Pulse Energy Femtosecond Laser

- **Refractive Index Modification**
 - Refractive error correction
 - Presbyopia correction
- **High Resolution Wavefronts**
 - Multiphoton process
 - Scanning μm -size laser focus
 - Repeat treatments: thin LIRIC layer, $\sim 10 \mu\text{m}$

Video courtesy of LightPath

1. Gandara-Montano et al., Optical Materials Express, 2017
2. Gandara-Montano et al., Optical Materials Express, 2018
3. Zheleznyak et al., ARVO 2018
4. Zheleznyak et al., ARVO 2019
5. Butler et al., ARVO 2019

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The LIRIC Platform

Low-Pulse Energy Femtosecond Laser

- **Refractive Index Modification**
 - Refractive error correction
 - Presbyopia correction
- **High Resolution Wavefronts**
 - Multiphoton process
 - Scanning μm -size laser focus
- **Below damage threshold**
 - No ablation
 - No tissue cutting
 - No flap required
 - Epi-on, no doping required

Lubatschewski, H. JRS (2009)

1. Gandara-Montano et al., Optical Materials Express, 2017
2. Gandara-Montano et al., Optical Materials Express, 2018
3. Zheleznyak et al., ARVO 2018
4. Zheleznyak et al., ARVO 2019
5. Butler et al., ARVO 2019

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Cornea:
Overcoming the limitations of laser refractive surgery

Minimally invasive surgery

- No incision, no flap, no dopants (Zheleznyak et al., ARVO 2019)
- Less keratocyte cell death (Wozniak et al., Exp Eye Res 2018)

Potentially less dry eye

- No corneal nerve damage (Wozniak et al., ARVO 2019)

Maintain tissue integrity

- Tissue sparing, no ablation

High optical quality

- High precision wavefront induction

First-in-Human Study (2018)

85

IOL:
Overcoming the limitations of cataract surgery

Residual Refractive Error

- Standard cataract surgery: ± 0.5 D sphere, >1 D astigmatism in 45% of patients¹
- LIRIC customized correction (0.05 D resolution)^{2,3}

Monofocal to Multifocal

Multifocal to Monofocal

1. Behndig et al., JRS 2022
 2. Gardner-Monaghan et al., OMEGA 2020
 3. Poppe et al., AAO 2022

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Contact Lens:
Overcoming limitations of traditional contacts

Superior Presbyopia Correction

- Internal diffractive multifocals superior to refractive multifocals

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Contact Lens:
Overcoming limitations of traditional contacts

Superior Presbyopia Correction

- Internal diffractive multifocals superior to refractive multifocals
- Similar evolution to multifocal IOLs (e.g. refractive to diffractive)

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Contact Lens:
Overcoming limitations of traditional contacts

Superior Presbyopia Correction

- Internal diffractive multifocals superior to refractive multifocals
- Similar evolution to multifocal IOLs (e.g. refractive to diffractive)

Higher Oxygen Transmissibility

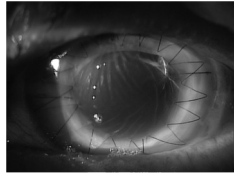
- Thin lenses for all Rx

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Updates on Modern Day Corneal Surgery

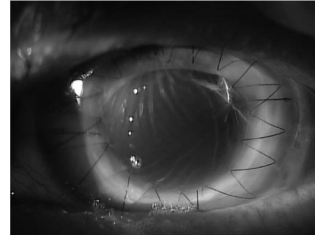
Common Corneal Procedures

- Corneal crosslinking
- Penetrating keratoplasty
- Descemet's stripping endothelial keratoplasty
- Pterygium surgery
- Superficial keratectomy



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Corneal Transplant



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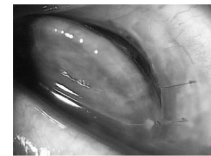
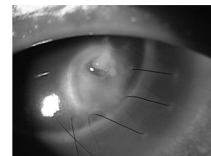
What to expect PK

- Day 1
 - Moderate to severe stromal/corneal edema
 - AC 1-2+ cell and pigment
 - Poor vision and pain
- Week 1
 - Moderate corneal edema may still be present
 - Vision is improved but still moderately decreased
 - AC some inflammation present (tr-1+ cell)
- Month 1
 - Most corneal edema should be resolved at this time
 - Refraction/Pachymetry/Atlas to monitor
 - AC is quiet
- Month 6
 - Stabilization
 - Select suture removal to decrease induced astigmatism

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Complications of Penetrating Keratoplasty

- Long-term complications
 - Glaucoma
 - Microbial keratitis
 - Suture-related problems
 - Wound dehiscence
 - Immunologic graft rejection
 - Late endothelial failure
 - Graft failure
- Refractive error, astigmatism



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Long-term maintenance

- Long term topical steroid to decrease rejection rate
- Some patients may require oral antivirals if corneal transplant is related to scarring from prior HSV
- Repeat PK may be needed after approximately 20 years

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Descemet's Stripping Endothelial Keratoplasty (DSEK)

- Sutureless transplant of the posterior cornea
- Replaces diseased portion of cornea with donor graft
- Donor tissue obtained by
 - Manual dissection
 - Microkeratome dissection
 - Femtosecond laser



1. Photos accessed from <http://www.moria-surgical.com/> on 8/26/11
 2. Photos accessed from <http://www.alcon.com/en/alcon-products/refractive-surgery.aspx>

96

Indications

1. <http://emedicine.medscape.com/article/1193218-overview>
 2. <http://webeye.ophth.uiowa.edu/eyeforum/cases/case5.htm>

97

DSEK/DSAEK Exclusion Criteria

- Exclusion
 - Corneal scarring
 - Aphakic
 - Iris loss / atrophy

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Advantages of DSEK/DMEK vs. PK

- Sutures
- Visual recovery
- Astigmatism / ametropia
- Epithelial complications
- Corneal allograft rejection
- Wound strength
- Globe stability
- Length of surgery
- Intraoperative complications
- Post op visits

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DSEK, PK Yield Similar Graft Survival

Price et al. Ophthalmology. 2011;118(4):725-729

- Retrospective, interventional case series
- DSEK graft survival rates
 - 95% for Fuchs
 - 76% for PBK/ABK
- PK graft survival rates
 - 93% for Fuchs
 - 73% for PBK/ABK
- Endothelial cell loss at 5 years
 - 53% in DSEK
 - 70% in PK

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DSEK Procedure

Incision / Stripping / Removal Donor Prep Centration

Removal of Fluid Closure of wound

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DSEK Average Visual Recovery

- 1 Day: 20/400
- 1 Week: 20/70
- 1 Month: 20/40
- 3 Months: 20/30
- 6 Months: 20/25
- 1 Year: 20/25-20/20

Dr. Gorovoy Study - Results presented during the AAO 2006 - Las Vegas

Terry and Shamie. Endothelial Keratoplasty. Retrieved from <http://www.dise.disek.com/disekprocedure.htm> on 6/20/08.

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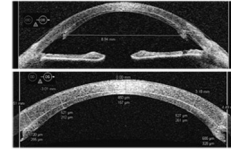
DMEK

- Graft of Descemet's membrane and endothelium only
- Better optical outcome of 20/25 or 20/20
- Difficult to manipulate
- Early graft dislocation risk
- Decreased risk of rejection

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DSEK/DMEK Complications

- Caused by any of the following
 - Graft-recipient interface
 - Fragile graft tissue
 - Graft location
 - Glaucoma
 - Infection
 - CME
 - Retinal detachment



Miller, J. Accessed from <http://www.revoptom.com/content/d/technology/c/16179/>

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Long-term Maintenance DMEK and DSEK

- Long term topical steroid
 - Helps decrease rejection rate
 - Steroid Lotoprednol, prednisolone acetate, FML 1 gtt QD typically
- Unknown length of graft viability
 - No long term data since started approx 2003
 - In theory surpass PK ~20 years
- 5 year Graft survival similar at 93%¹

1. Price DA, Kelley M, Price FW Jr, Price MD. Five-Year Graft Survival of Descemet Membrane Endothelial Keratoplasty (EK) versus Descemet Stripping EK and the Effect of Donor Sex Matching. *Ophthalmology*. 2018 Oct;125(10):1508-1514. doi: 10.1016/j.ophtha.2018.03.050. Epub 2018 May 3. PMID: 29731147.

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Limbal Stem Cell Deficiency

- When limbal stem cells begin to struggle and poorly function, the epithelial cell layer and its reproduction becomes compromised
- Loss or deficiency of stem cells in the limbus which are vital for re-population of the corneal epithelium and to the barrier function of the limbus
- Once limbal stem cells are damaged the epithelium will be replaced by conjunctival goblet cells

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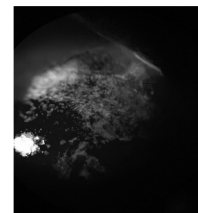
LSCD Causes

- | | |
|--|---|
| <ul style="list-style-type: none"> • Acquired <ul style="list-style-type: none"> • Trauma • Contact lenses | <ul style="list-style-type: none"> • Autoimmune <ul style="list-style-type: none"> • Sjogrens Syndrome • Stevens Johnson syndrome • Mucous membrane pemphigoid |
| <ul style="list-style-type: none"> • Inflammatory <ul style="list-style-type: none"> • DED • Allergy • Neurotrophic keratopathy | <ul style="list-style-type: none"> • Congenital <ul style="list-style-type: none"> • Aniridia • Autoimmune Polyglandular Syndrome • Keratitis, Ichthyosis, and Deafness Syndrome |

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Signs and Symptoms

- Varying degree of ocular signs depending on severity and level of corneal conjunctivalization
- Symptoms
 - Decreased vision
 - Photophobia
 - Tearing
 - Blepharospasm
 - Recurrent pain



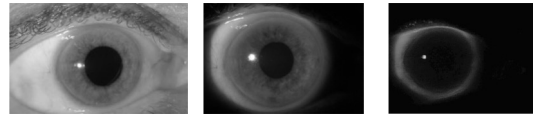
108

Severe LSCD

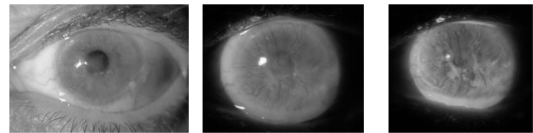
- **Conjunctivalization**
 - Corneal surface stains abnormally because the conjunctival epithelium is more permeable to the stain than true corneal epithelium
- More prone to recurrent or non-healing epithelial defects
- **Stromal scarring or melting**
 - Expect more pain and vision loss

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NORMAL EYE

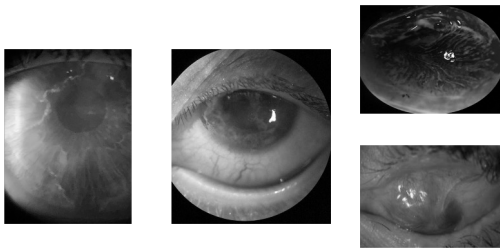


TOTAL LSCD



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Conjunctivalization



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Non-Surgical Treatment

- Remove traumatic or toxic insults that may be the cause
- Discontinue contact lens wear
 - Possible refit in scleral
 - Bandage CL?
- Discontinue or switch topical medications
 - Glaucoma medications
 - Preservative sensitivity

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Non-Surgical Treatment

- Treating underlying systemic causes
 - Autoimmune control
- Improve tear film and control inflammation
 - Vitamin A ointment QHS
 - Topical steroids
 - Compounded Preservative Free option
 - Topical cyclosporine
 - Preservative free AT
 - Punctal Plugs




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Non-Surgical Treatment

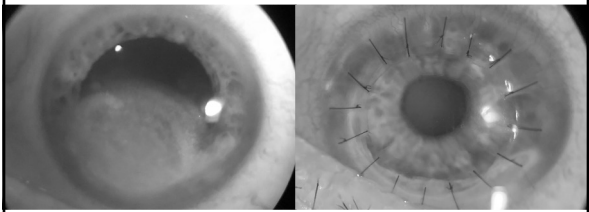
- Amniotic membrane
 - Dehydrated vs cryopreserved
- Amniotic membrane drops
 - Can be costly and not covered by insurance currently
- Serum Tears
 - Can be costly and inconvenient
- Cenegermin
 - Neurotrophic keratitis

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DALK (deep anterior lamellar keratoplasty)

Corneal transplantation techniques:	
 <p>PK</p>	1. PK: All corneal layers are transplanted.
 <p>DALK</p>	2. DALK: Only the superior corneal layers are transplanted.
 <p>DMEK</p>	3. DMEK: Only the deep corneal layers are transplanted.

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Pre/Post Example of Big Bubble DALK

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Post-Operative Care

- Moxifloxacin QID OD x 1 week and Difluprednate starting at QID OD and tapered down to Loteprednol QHS OD for maintenance
- Several corneal sutures removed after 6-9 months
- Cataract extraction OD
- Final BCVA 20/25 OD

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Pterygium

- “wing” like ocular surface lesion originating from limbal conjunctiva within the palpebral fissure progressing to the cornea
 - Nasal and temporal
- More common in people with history of increased UV exposure
 - Males>females
- Typically asymptomatic
 - Induced astigmatism

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Treatment

- Non Surgical
 - Treat the ocular inflammatory response
 - Cyclosporin
 - Lifitegrast
 - Topical steroids
 - Artificial tears
- Surgical
 - Encroaching on visual axis
 - Preparing for cataract surgery
 - Significant induced astigmatism

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What to expect after Sx

- Day 1
 - Epithelial defect
 - Conjunctival injection, check wound site
- Week 1
 - Epithelial defect healed with haze
 - Conjunctiva check for secure wound site
 - Monitor for wound dehiscence
- Month 1
 - Haze resolution
 - Conjunctival stabilization

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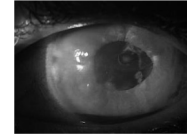
Long term treatment

- Control UV exposure
- Control dryness and inflammation
 - Cyclosporine
 - Lifitigrast
 - Artificial tears
 - Topical steroids
 - Punctal plugs
- Will help to control reoccurrence

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Lamellar keratoplasty

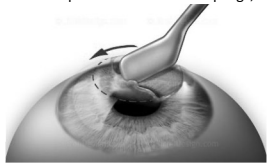
- Indications:
 - ABMD
 - Salzmanns
 - Band Keratopathy
 - RCE
 - Corneal scars



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Lamellar Keratoplasty

- Corneal epithelium is removed down to Bowman's layer
- Can be performed in slit lamp or operating room using Weck-cel sponge or scarifier blade, and cleaned up with diamond burr
 - After removal surface is polished with cellulose sponge, antibiotics, and THBL placed



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Long Term Treatment

- After lam K for RCE
 - Maintain THBL for 3 months
 - Oral Doxycycline
 - Topical Antibiotics
 - Topical Steroids
 - Vitamin C
- Control of ocular surface disease

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Comanagement Pearls

- Opportunity to provide cutting edge technology
- Importance of your recommendation
- Patient education is critical!

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Comanagement Pearls

- Identify potential causes of surgical complications
- Educate your patients your role within medical eye care
- *We are all judged by the visual outcomes our patients. Comfort and quality of vision is the key!*

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Thank you!!

Questions?

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